PATENT SPECIFICATION (11) 1 449 790

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(54) IMPROVEMENTS IN ADHESIVE TAPES

(71) We, THE KENDALL COMPANY, of 95 West Street, Walpole, Massachusetts, United States of America, a Corporation organised and existing under the laws of the State of Delaware, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

In Specification No. 1256444 we have described and claimed a conformable, elastic tape comprising a woven elastic backing fabric weighing, when relaxed, 100 to 300 grams per square yard, having non-elastomeric filling yarns and including among its warp yarns elastic warp yarns having covered elastomeric cores and distributed across the fabric in an amount of between one elastic warp yarn every third warp yarn to one elastic warp yarn every sixth warp yarn, the fabric assuming, when relaxed, non-planar major surfaces including intermingled raised and depressed areas constituted by transversely extending ridges and valleys but becoming appreciably more nearly planar when fully stretched, and a layer of pressure-sensitive adhesive, which extends continuously over one face of the backing fabric, is adherent to the backing fabric and conforms to the contour of the backing fabric, the elastomeric warp yarns floating across a plurality of successive filling yarns on the adhesive-coated side of the fabric. The layer of adhesive extends as an unbroken layer apart from small, local interruptions, which may be provided at intervals if desired, to render the tape air permeable.

Adhesive tape is normally supplied in a roll and difficulty is sometimes experienced in unrolling such a tape because of a tendency of the adhesive on each convolution of the roll to stick to the uncoated surface of the backing of the superposed convolution.

The present invention is based on the discovery that certain modifications in the weave pattern of the backing of the tape, as well as certain modifications in the structure of certain yarns used in the weave pattern, provide a tape having susbstantially the same characteristic and performance as that disclosed in Specification No. 1256444 but an improved unrollability.

The invention accordingly provides an adhesive tape constituted by a pressure sensitive adhesive coated on one surface of a woven backing fabric, which comprises elastic warp yarns including elastomeric filaments which are interspersed with non-elastomeric warp yarns which include multiple filament nylon yarns having a denier per filament of between 2 1/2 and 5 1/2, each elastic warp yarn being floated on one side of the fabric across a plurality of filling yarns and having been stretched during weaving of the fabric and coating the fabric with the adhesive.

Due to the fact that the elastomeric warp yarns have been stretched in the woven backing fabric, the latter when relaxed will assume a surface corrugation in which transverse corrugations occur along the elastomeric warp yarns. The increase to 2 1/2 to 5 1/2 in the denier per filament of the filaments employed in the nylon warp yarns of the backing fabric result in an improved unrollability. Furthermore, it has been discovered that the use of an overall weave pattern in which the various nylon warp yarns are woven adjacent to one another with opposite weave patterns results in improved unrollability of the product. It is believed that the improved unrollability is probably due to the reduction, in certain warp yarns, of tiny loose filament ends which are available for contact with the adhesive on an overlying convolution of the tape roll.

In preferred embodiments of the invention, each nylon warp yarn is a 70 denier, two ply, 17 filament yarn (having a denier per filament of about 4); the other non-elastic warp yarns are cotton yarns; and the warp yarns are distributed across the backing in the ratio range of an elastomeric filament warp yarn constituting every seventh warp yarn to an elastomeric

filament warp yarn constituting every thirteenth warp yarn.

The weave patterns of three embodiments of backing fabric according to the invention are respectively shown in Figures 1, 2 and 3 of the accompanying drawing.

Each Figure shows schematically a portion of the fabric backing. In each case the warp yarns are marked W_1, W_2, ..., the last of the warp yarns, W_{11} in Figure 1, W_8 in Figure 2 and W_{14} in Figure 3, in each weave pattern being a repeat of W_1. Similarly, the filling yarns are marked F_1 to F_9, F_9 being a repeat of F_1 for each weave pattern.

The backing fabric bears on one surface a coating (not shown) of pressure sensitive adhesive which is applied as described in Specification No. 1256444.

The filling yarns 20 are preferably natural cotton yarns, although many alternatives are suitable. The warp yarns are of three separate varieties; elastomeric warp yarns 22 (preferably 140 denier Avril (Registered Trade Mark) corespun yarns available from Stretch Yarns, Inc. of Fall River, Mass., U.S.A.), 60 denier, two ply cotton yarns 24, and 70 denier, two ply 17 filament nylon superloft yarns 26. The elastomeric yarns 22 are floated across a number of filling yarns.

In the fabric shown in Figures 1 and 3, the nylon yarns 26 (with the exception of those adjacent the elastomeric yarns 22) are woven in pairs with opposite weave patterns and separated by cotton yarns 24. This binds the nylon tightly into the backing fabric so as to reduce the availability of loose nylon filaments ends for contact with the overlying adhesive when the tape is wound into a roll.

Since the nylon yarns in the tape according to the invention have a denier per filament of between 2 1/2 and 5 1/2, the fabric contains very few fine nylon filaments which are susceptible of being pulled out of the surface of the fabric for contact with an overlying adhesive coating in the ultimate roll of tape. The practical upper limit of denier per filament is approximately 5 1/2, since any further increase tends to render the nylon yarns too coarse to be acceptable in the manufacture and use of the tape.

In the fabric shown in Figure 2, the nylon yarns 26 are woven in the same weave pattern and alternate with the cotton yarns 24.

WHAT WE CLAIM IS:—

1. An adhesive tape constituted by a pressure sensitive adhesive coated on one surface of a woven backing fabric, which comprises elastic warp yarns including elastomeric filaments which are interspersed with non-elastomeric warp yarns which include multiple filament nylon yarns having a denier per filament of between 2 1/2 and 5 1/2, each elastic warp yarn being floated on one side of the fabric across a plurality of filling yarns and having been stretched during weaving of the fabric and coating the fabric with the adhesive.

2. A tape as claimed in claim 1, wherein each nylon yarn is a 70 denier, two ply 17 filament yarn.

3. A tape as claimed in claim 1 or claim 2, wherein each nylon yarn is adjacent no more than one non-elastomeric warp yarn which is of material other than nylon and adjacent nylon yarns are woven with opposite weave patterns.

4. A tape as claimed in claim 3, wherein the non-elastomeric warp yarns of material other than nylon are cotton yarns.

5. A tape as claimed in any one of the preceding claims, wherein the warp yarns are distributed across the fabric in the ratio range of an elastomeric filament warp yarn constituting every seventh warp yarn to an elastomeric filament warp yarn constituting every thirteenth warp yarn.

6. A tape as claimed in claim 1, having a backing fabric substantially as described herein with reference to Figure 1 or 3 of the accompanying drawing.

7. A tape as claimed in claim 1, having a backing fabric substantially as described herein with reference to Figure 2 of the accompanying drawing.

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1449790 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

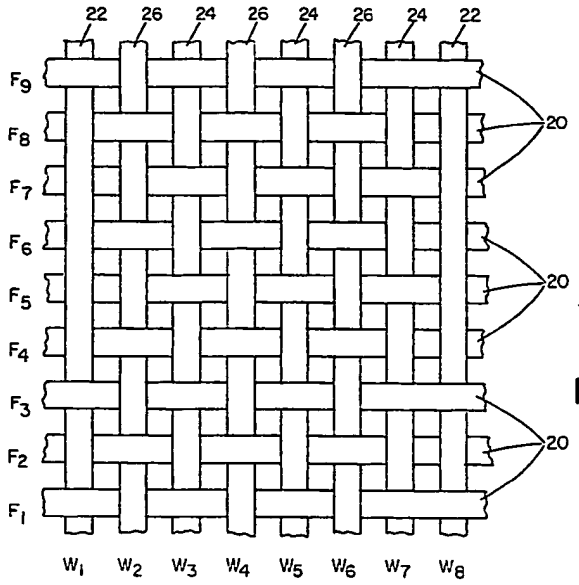

FIG 2

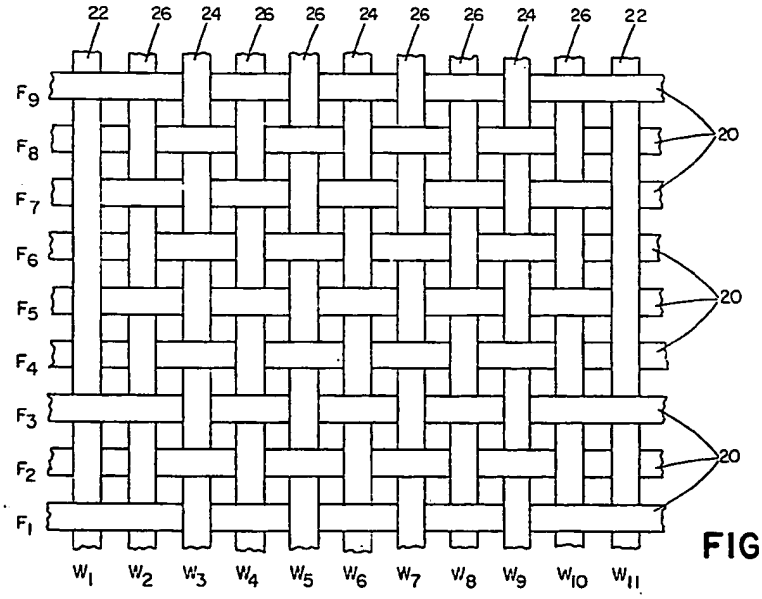

FIG 1

1449790 COMPLETE SPECIFICATION

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Sheet 2

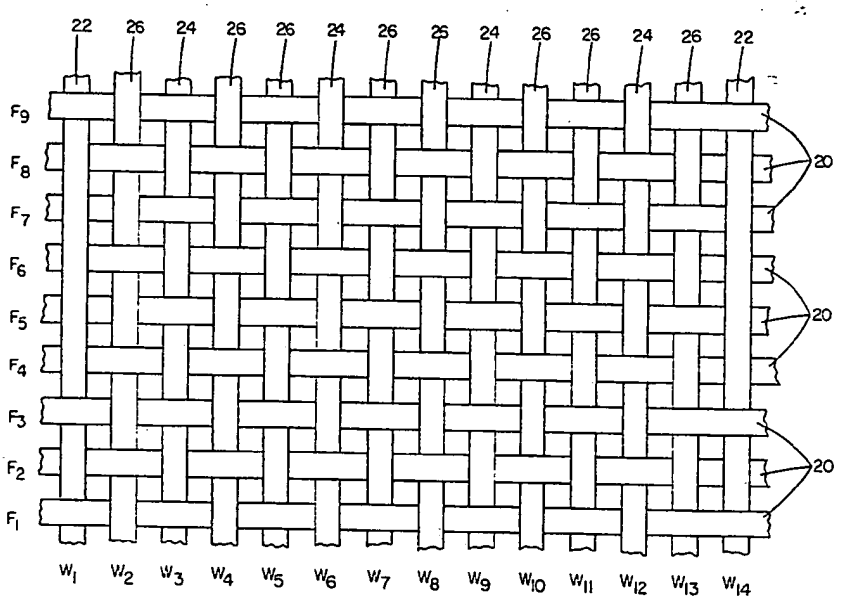

FIG 3